

ON AINHUM.*

BY

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THE disease which the African negroes (Nagôs) name "ainhum," or "ayun," was first described by myself in the *Gazeta Medica du Bahia*, November 13 and 15, in the year 1867. Its existence in Brazil as a distinct affection is not mentioned before the date named above, in any known document, although the disease must have been observed by Brazilian physicians since the beginning of the African slave trade, as in this country the affection is peculiar to Africans or their descendants.

Synonymes.—Since the date of the commencement of my medico-surgical studies, I have always heard the affection denominated *guijila*,—a term which these same negroes apply to the mutilating lepra of the fingers and toes, the *gafeira* of Portuguese authors.

It was in the year 1863 that I began to observe attentively cases met with in practice, and to note the differences which distinguish the two diseases. The conclusion was speedily reached that the two disorders, *guijila* and *ainhum*, differed from each other completely. After my first publication there appeared in this country and elsewhere important researches on the subject, to which I shall presently allude.

In order to exactly designate the malady, I have preferred to adhere to its African name, which I first heard from the negro patients themselves, the Nagôs, and which they were in the habit

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of pronouncing "ai-nhum," with the emphatic accent on the first syllable. They declared that the word signified "to saw." Other negroes (the Jêjês) informed me that in their tongue the affection was termed "*gudurum*." One of the blacks who suffered from the complaint called it "*affovi-burun-cuè*," but from none of the latter could I obtain the signification of these terms. The name *guijila*, a corruption of the Portuguese word *guizilia*, ought to be no longer applied as a synonyme for the name of this disease, as it tends to confound ainhum with a malady of a very different nature. Dr. A. Collas, of the French Navy (*Archives de Méd. Navale*, November, 1867), states that he observed the disease in the Pondicherry Indians of crossed Aryan race, and he gave to it the name *exérèse spontanée*. 9/

Lastly, Dr. C. Beauregard, of Havre (*Des Difformités des Doigts*, Paris, 1875), proposed the name *dactylôse* as a generic designation for all the affections leading to deformities of the fingers and toes, inclusive of ainhum, which he calls *dactylôsis essentialis*, in preference to the term *exæresis spontanea*, the former name having the advantage of indicating the seat of the complaint. oly

For my part, I prefer to retain the primitive name of the disorder, ainhum (to saw), given to it by the individuals more particularly subject to its attacks,—that is, the negroes (Nagôs),—a name that, besides indicating the African derivation of the malady in Brazil, recalls further the idea of its chief morbid processes and natural termination, viz., slow separation of the affected toe. I owe to the kindness of a learned friend the opportunity of verifying the meaning of the word *ayun* or *ainhum*, according to my appreciation of its pronunciation by the Nagô negroes. In the "Grammar and Dictionary of the Yoruba Language," by the Rev. J. T. Kowen, Washington City, 1858, it is stated that the word *ayun* or *ainhum* means a saw, a file, with the additional declaration that the "a" is sounded long, as in the English word father. oly

Notwithstanding the fact that there are slight variations in the spelling and pronunciation of the name, I do not now consider myself justified in changing either, as it is well known to, and has been adopted by, all the writers who have succeeded me in the study of the disease. B

It remains for me merely to add, for the benefit of those who are unacquainted with the Portuguese language, that ainhum, with the accent on the first syllable, if written for the French pronunciation, should be spelled *ágnoum*; if for the Spanish, *añum*; and if for the English, approximately, *ay-nyoon*. 2

In Portuguese, the two words *ainhum* and *aiyun* are uttered so nearly alike that it is not worth while to alter the orthography adopted by me, which most nearly corresponds with the African pronunciation, lately verified in the manner described above.

Geographical Distribution.—According to the testimony of the African blacks living in Brazil, the complaint is common on the west coast of Africa, their native country, but it is not yet known

how far into the interior and how far to either the south or east the disease extends. Up to the present time I know of but one case of ainhum occurring in Nossi-bé, an island near the northwest coast of Madagascar, and this information was gained from Dr. Carré, of the French Navy (*Archives de Méd. Navale*, February, 1879). The natives there call the disease *faddiditi*. So far as I know, the disease is encountered in Asia only in Pondicherry, in French India, and there in Indians of the Tamul branch. In South America it is seen in Bahia, Rio de Janeiro, and Buenos Ayres only, and here in the person of African blacks, but it is certain that the disease shows itself equally in all the Brazilian provinces where slavery exists.

There is no positive evidence that ainhum has ever attacked the aboriginal Brazilian Indians. One of these, whom I had under my charge in the Charity Hospital of Bahia, had at the base of the fourth toe a slight semicircular depression, very similar to that which in the African negro corresponds to the first stage of the malady. We may gather, therefore, that the geographical distribution of ainhum is at the present very limited, but I have no doubt that it will be extended very considerably when the disease becomes better known to physicians residing in or visiting tropical countries.

Definition.—Ainhum is a disease peculiar to the African race, characterized by a slow, progressive, fatty degeneration, generally with considerable increase in volume of the toes, especially of the smallest, involving almost all their anatomical elements, resulting from a nearly linear strangulation, which last is occasioned by the presence of a narrow strip of contracted and hardened skin, which embraces at first a part, and afterward the whole, of the circumference of the toe, on a level with the digito-plantar fold. This constriction, after the lapse of from four to ten years, forms a deep circular furrow, which determines the absorption of the phalanges and the obliteration of the vessels, with the final and inevitable dropping off of the toe, either as the result of accidental injury or gangrene.

Frequency.—Although twenty years ago cases of ainhum were frequently encountered, they are at the present date becoming rarer, through a gradual diminution in the number of the African negroes living here, and because their Creole or Brazilian-born descendants are less subject to the disease.

But still in private, and more rarely in hospital, practice patients are seen generally demanding, not a cure for their complaint, but amputation of the affected toe. Such cases would be still more often encountered if those affected with the disease did not, instead of appealing to medical aid, have recourse to their companions or countrymen and to the barbers to have their toes cut off, the digit often being suspended from the limb by a mere shred of tissue, or if they did not themselves frequently practise its removal by strangulating the part with a string or shaving it off with a razor.

There are few surgeons or physicians in Bahia who have not am-

putated such toes. My friend Dr. J. L. Paterson counts upwards of twenty such minor operations, and I myself sixteen, in the course, it is true, of many years' experience. Before the extinction of the African slave-trade the disease must have been much more frequent in this place, and more so also on the African coast, where, according to the statements of the patients, it is found commonly affecting men and women and different members of the same family, transmitted by heredity like elephantiasis or lepra, which the Africans recognize and distinguish from ainhum by the African name, *élé*, —leprosy.

Seat.—Up to the date of my publication of the first paper on ainhum, in 1867, I had no knowledge of any case in which the complaint had localized itself in any other than the little toe, that is, in one or both of the little toes simultaneously or successively. Later, however, Dr. Paterson showed me a case in which the affected toe was the fourth alone; and in these last four years four similar cases have been noted, two in Rio de Janeiro (one by Dr. Baptista Dos Santos, and the other by Dr. Pereira Guimarães), a third case in Buenos Ayres, by Dr. Emilo Cāni, and finally, about two months ago, one by Dr. Hall, of this city, who kindly offered me the amputated organ. It is this which I have the honor of presenting to the American Dermatological Association, in connection with the present notice of the disease.

Up to the present time these five are the only known exceptions, in a series of about fifty cases, to the rule that ainhum manifests itself in the little toes. Thus far there are no examples of either of the remaining toes becoming involved. It is worth while recording the fact that in Dr. Pereira Guimarães' case, conjointly with the fourth left toe, the fifth right toe was also affected.

Causes.—What I wrote thirteen years ago, relative to the etiology of ainhum, I am able to repeat at the present date. Its causes are entirely unknown. It can be certainly affirmed that the African race is specially predisposed to the malady, men much more than women, and individuals born in Africa much more than those native to Brazil. The Nagôs negroes, who preponderate numerically in this province, furnish also the larger number of cases for clinical observation. At first I supposed that the affection occurred in the blacks chiefly because they walked with bare feet, but the freedmen and freeborn who walk in shoes enjoy no immunity.

The occupation, mode of life, and hygienic conditions in which the negroes here live, and which in general may be said to be unfavorable, do not appear to influence the manifestations of the disease. The great obliquity of the flexor tendons of the two last toes of the splay-footed black was suggested to me as a possible cause of ainhum by my friend, Dr. J. L. Paterson. It is very probable that this anatomical disposition may hasten the development and progress of the disease, but, in my judgment, it cannot explain its origin and initial symptoms.

Symptoms.—Ainhum begins by a slight and somewhat less than

circular depression, occupying the internal and inferior aspects of the root of the little toe, exactly on a level with the digito-plantar fold. The skin corresponding to this initial depression is both thickened and indurated, and, at this period, there is no inflammatory phenomenon, ulceration, nor notable pain to attract the attention of the patient. It is rather a species of pruritus. The limited movements of the digit are preserved. Later, it may be noted that the affected toe, if it be the little one, gradually separates itself from its neighbor at the root. Its free extremity, however, tends to incline inward, forming thus an angle at the level of the depression. The digit gradually increases in volume, as the cutaneous depression extends all around the superior and external parts of the toe in a circular direction. There is no actual pain in the part, but tenderness is evoked upon pressure over the furrow and the adjacent surfaces. When the constricting circle is completed the once shallow depression becomes a deep and narrow furrow, as if produced by the metallic wire of an *écraseur* which had disappeared by burying itself within the tissues. This slow and progressive strangulation of the toe proceeds to such an extent that at last nothing remains of its attachments to the foot save a short and slender pedicle, which can be made visible with difficulty by separating the margins of the furrow. At the bottom of this latter there can be recognized at times an ulcerative process, and at others merely the existence of a crust. When there is ulceration the furrow is moistened by an ichorous and fetid discharge. The adjacent skin becomes rough and scabrous, while the extremity of the toe increases to twice and even thrice its normal size, assuming the globular shape of a small potato. The nail remains intact, but in consequence of a partial rotation of the toe it becomes turned outwards. In the concluding stage of the disease the toe acquires abnormal mobility, and can be inclined to either side or twisted partially on its axis in either direction. It is at this stage that the first phalanx has completely disappeared on a level with the furrow. The pain, which during an earlier period of the disease was insignificant or not intense, becomes now, in certain cases, sharp, and is intensified by the movements of the digits. This increases to such an extent that the sufferers are in the habit of stuffing the furrow with a string, a wisp of cotton, or a strip of cloth, to limit, as far as possible, the movement of the digit, and to prevent the occurrence of the contacts to which it is subjected in consequence of its increased weight, by which it is inclined downwards to the ground. It is generally after this condition has been reached that patients practise or demand amputation as the sole relief from their sufferings. They nevertheless have recourse to this treatment in certain cases at an earlier date, and before the destruction of the continuity of the phalanx, not only in seeking for relief from pain, but also in order to remove the impediment to their gait or the interference with their occupations.

Pathological Anatomy.—The first studies in the pathological anatomy of ainhum were made at my request by my late friend,

Dr. Wucherer, in the toe of the right foot, figured in the annexed engraving. The complaint in this case lasted ten years. The toe,



amputated by the stroke of a small scalpel, is twice as large as the normal organ, and its shape is that of a small ovoid potato. The skin of the superior surface is thickened, scabrous, and rough to the touch, but normal in respect to its other surfaces, as is also the nail. I quote further from the report of the examination made by Dr. Wucherer in this and other toes: "The traumatic surfaces of the wounds, resulting from the amputation of the toe from the foot, are concave, perhaps from the elastic constriction of the skin interested in the furrow, and in them no bone can be recognized. The surface of the toe is somewhat wrinkled, in consequence of the saliency of the linear projections of the cuticle. On cutting the toe longitudinally, and

in such a manner that the section divides the nail and splits the digit into two equal halves, we find, in the more developed cases of the disease, that the first phalanx has entirely disappeared, and that of the second only vestiges remain, while the distal phalanx is the least reduced. What remains of the second phalanx is scarcely two millimetres in its largest diameter, the length of a normal second phalanx being seven millimetres. The articulation between the second and last phalanges can be well made out, and the apposed articular surfaces are covered by cartilage. On the posterior portion of the remains of the second phalanx, cartilage can be no longer recognized.

"On microscopical examination of the component textures of the toe, the cuticle is found to be little altered; the area occupied by the subcutaneous fatty tissue is extensively increased at the expense of the tendons, bones, and other tissues, and in this space there are scarcely any traces of connective tissue (*Bindegewebe*), specially around the blood-vessels. Of the two arteries of the toes the external alone remains. The articular cartilage of the second and last phalanges is thinned, its corpuscles are smaller in size and fewer in number than normal. In the hyaline substance, between the corpuscles of the cartilage, are developed numerous fatty points. The cavities of the spongy substance of the bones are larger than natural, and enlarged at the cost of the concentric lamellæ around the Haversian canals, being also filled with large yellow globules of fat. The bones present a worm-eaten appearance, although no

caries exists. There is no vestige of pus. Here and there the bone-corpuscles are scarcely visible. The disease appears to consist essentially of an atrophy or fatty degeneration of the parts from want of nutrition, an effect of the constriction to which the toe has been subjected."

The anatomical and pathological examinations made in London in 1867-68 by Campbell de Morgan and John Wood; in Paris, 1870, by Cornil; in Tübingen, 1872, by Professor Schüppel, and in Rio de Janeiro, 1875, by Pereira Guimarães and Martins Costa, do not differ materially in their results from those given above.

Course and Duration.—The course of ainhum is always gradual and prolonged, so that between the time of manifestation of the initial symptoms—that is, the depression and furrow upon the external and superior aspects of the toe, the extraordinary mobility of the organ caused by the depth of the circular furrow, the destruction of the phalanges and the tenuity of the pedicles that bind them to the foot—there is an intervening period of between four and ten years.

Termination.—Towards the end of the complaint the toe is left hanging to the foot by a very slender pedicle, or becomes separated from the foot violently by a blow, or gangrene may induce this result by destruction of the last vessels and nervous filaments which had sustained nutrition and sensibility in the small mass nearly severed from the body. I have met with each of these modes of termination, but they are not common, because the patients frequently hasten the fall of the toe by artificial strangulation or incision.

Nature of the Disease.—Ainhum has been considered to be:

1. An atrophy or fatty degeneration of the toe from want of nutrition (Wucherer).

2. A symptom of *lepra dactylia* (Collas).

3. Slow gangrene *sui generis* (Pereira Guimarães).

1. As already stated in another part of this paper, the results of the anatomico-pathological examination made by Wucherer in various toes affected with ainhum, and which were amputated by him, by others, and by myself, do not differ much or materially from those reached both here in South America and in Europe by noted pathologists in their investigation of similar specimens furnished to them. The slight differences between them relate to the circumstance that some did, and others did not, establish persistence of the first phalanx, ankylosis of the second with the third, integrity of the nail, and separation of the epidermis from the cutis vera. But all these differences depend on the degree of development of the disease, or are accidents foreign to its regular progress. The phalanx, for example, is always absent, wholly or in part, in an advanced stage of ainhum, so that the toe is no longer fastened to the foot, but is attached merely by a slender pedicle. Moreover, the toe, under these conditions and so long as it enjoys any degree of vitality, is not exempt from inflammation through the influences of accident, and from the ordinary consequences of this morbid

process. Atrophy and the absorption of some of the normal tissues, and fatty degeneration or abnormal accumulation of others, are the most notable facts that dissection and the microscope have revealed. But what these alterations indicate is an insufficiency or perversion of the nutrition of the component parts of the toe, which leads to a retrogressive metamorphosis of all its tissues, and finally even to the production of gangrene. Certainly, the linear induration and depression of the skin at the base of the digit, as well as the circular furrow which succeeds these in the course of the complaint, are not alien to the morbid process described. It is in this species of limited and localized scleroderma, and in the extremely slow but continuous and progressive constriction of the tissues produced by this narrow cutaneous belt, that, in my judgment, we find the key to the problem of the pathogenesis of ainhum. What we do not know is the nature and cause of the alteration in the skin by which its circular contractility is induced. As the disease has no influence whatever on the general health, and as it occurs in entirely healthy individuals who present not the slightest evidences of a constitutional malady, either concomitant or remote, it must be considered to be a purely local ailment, which, after the loss of the toe and the cicatrization of the small resulting sore, leaves the patient in his condition of natural health.

2. In my first paper on this subject, notwithstanding that the capital differences which separate ainhum from elephantiasis in any of its known forms are very obvious, I yet sought to fix clearly and to contrast the distinguishing features of each of these diseases by the simple co-ordination of their symptoms, development, and termination. I then proposed to myself to put an end to the confusion which formerly prevailed here between ainhum and guijila (*lepra anæsthetica* or the Portuguese *gafeira*). For any medical man familiar with the two disorders such a comparison would be needless, but for the profession in general I considered this course necessary, and still so consider it. Dr. Collas and, after him, other French physicians have contended that ainhum should again enter into the division of leproid affections (*lepra dactylana amputans*), under a title that does not, however, affiliate it with this species of *exæresis spontanea*.

I will here reproduce the differential symptoms of the two diseases, with the slight modifications and additions derived from observation:

First.—Guijila attacks equally individuals of both sexes; ainhum, on the contrary, enumerates its victims chiefly in the male sex.

Second.—Gafeira, although more common in Brazil among the blacks than in people of another color, in the African more than among their Brazilian-born descendants, still affects both, and the hands as much as the feet, separately or conjointly, having no special predilection for a particularly determinate finger or toe, while, so far as I know, ainhum has as yet not been observed in Brazil except among negroes, and then on the fifth toe, rarely on the fourth.

Third.—Anæsthesia, pemphigoid bullæ, and muscular atrophy, unknown in ainhum, commonly accompany gafeira in some of its phases, and the same is the case in gangrenous ulcerations, necrosis, thinning and permanent contracture of the fingers, etc.

Fourth.—The highly characteristic and invariable furrow, on a level with the digito-plantar fold, so pathognomonic of ainhum, is never observed in gafeira or guijila. 9/

Fifth.—Finally, the curability of ainhum without mutilation in its first stages, by an incision of the skin perpendicular to the line of the furrow or constricting ring, is, at this date, demonstrated by facts of my own and others' observation, while in gafeira, especially in the amputating form of Dr. Collas, the most the surgeon can do is to hasten the fall of the finger. He can mutilate the patient, without, however, curing the disease, and the best efforts of surgical therapeutics have sought in vain to obtain better results than this.

Now if the clinical features of ainhum, distinct and clear as they are, be not enough to remove, once for all, every possibility of its confusion with lepra dactyliana, there still remains the anatomy and pathology of ainhum to dissipate whatever shadow of a doubt may remain in the most exacting mind. On the one hand, Wucherer, Campbell de Morgan, Wood, Cornil, Schüppel, Martins Costa, etc., on the other, Ch. Robin, Virchow, and other skilful microscopists can furnish to those interested in the question the histological characters which distinguish respectively the morbid processes of each of the two diseases.

The limits of this paper do not permit me at this time to enter into a lengthier discussion of this point, nor does it now seem to me to be demanded. The field has been well held against the morphological classification of Dr. Collas, by Drs. Moncorde, Martins Costa, and Pereira Guimarães, in Brazil, Emilio Cuni, in Buenos Ayres, and, recently, by Dr. Brassac, of the French navy, in a judicious critique published in the *Archives de Méd. Navale* of December last. I will reserve the detailed treatment of this matter for a work upon whose preparation I am now engaged, of which I here present merely a *résumé*. 10/

3. Rejecting the leprous nature of ainhum, Dr. Pereira Guimarães considers it as a "gangrene *sui generis*, in which the liable toes go on receiving for some time nutritive material in quantity insufficient for their perfect nourishment, but still enough to prevent the immediate occurrence of gangrene. Thus it results that the toe progressively suffers from the process of a retrograde metamorphosis until the point is reached when nature must interfere by its separation. The cause of this series of phenomena is the contraction of the arteries by which the part is nourished."

Assuming the original cause of the trouble to be that given above,—viz., a contraction of the arteries,—Dr. Pereira Guimarães does not attach any importance to the circular furrow characteristic of ainhum, preferring to regard it as a result, and not as a factor, of the disease.

But the analogies and arguments on which is based, in the absence of facts, the opinion of the distinguished physician of Rio de Janeiro, do not seem to me conclusive, and have led him to discover, in explanation of the morbid process, a special form of gangrene *sui generis* quite different from all recognized forms of gangrene, since it permits the organ attacked by it to sustain life, not for days and weeks, but four, six, and even ten years. That at the end of this long period a toe affected with ainhum should be separated by a gangrenous process is perfectly comprehensible, and, as a matter of fact, this does occur; but only as a complication after a period of slow inanition, so to speak, in an organ whose scanty nutritive elements are at a stroke withdrawn by the destruction of its last arteries.

I believe that this would be the sole natural termination of the disease if its ordinary course were not hindered, and the part were left undisturbed by accident or surgical interference.

In my judgment the pathological processes of ainhum terminate when gangrene begins,—viz., when the constricting ring strangulates the toe, and completely intercepts the circulatory and nervous relations between it and the rest of the body. If ainhum were a gangrene even *sui generis*, the pathological physiology of the disease would be absolutely incomprehensible, and the professed and received ideas relative to gangrene would have to be greatly modified.

Diagnosis.—After this exposition of the more salient features of the disease, and of the differences between it and the other disorders which can be recognized in the same situation, it will be evident that the diagnosis of confirmed ainhum is extremely easy. The deep sulcus at the base of one of the two last toes, with more or less increase in the size of the extremity of the affected organ, its rounded shape, its abnormal mobility, the preservation of its sensibility, the spontaneous or provoked pain in it, well characterize completely developed ainhum. These symptoms, and others already mentioned, distinguish ainhum from lepra dactyliana, or gafeira, in such a manner that it seems to me impossible to confound the two diseases. At the onset of the first-named affection, however, when, instead of a furrow, there exists merely a slight depression, the diagnosis may offer some slight difficulties. In such a case the probability of ainhum may be strengthened by the circumstance of the patient being of the African race, by the absence of all traumatic causes to produce ulceration or cicatrix in the usual situation of the sulcus, and by the absence of all manifestations of lepra, syphilis, or scrofula in other parts of the body. More important, however, than these, the progress of the ailment will serve to guide the judgment of the physician. In the intermediate stage of ainhum, when undue mobility of the toe has not yet become noticeable, the more or less completely circular gutter, with or without ulceration of its floor, which latter is still visible, in connection with the other elements of diagnosis already enumerated, will leave no doubt as to the nature of the affection.

Prognosis.—As it is a purely local disease, ainhum is not dangerous; nor does it bear relation to the general health or life of the patient. In its advanced stages, however, it is accompanied by pain in walking and embarrassment in the gait, and leads, when not early treated, to inevitable loss of the toe. Fortunately, these inconveniences can be removed in the first stage of the disease by incising the constricting ring, thus putting an end to the constant pressure which it exercises upon the tissues. This slight operation is, however, seldom practised, because, for the most part, patients resort to physicians only when amputation of the digit has become inevitable.

Treatment.—The treatment of ainhum has been entirely local. The various therapeutic measures employed locally, such as lotions, cataplasms, ointments, cauterizations, etc., have done no good, whether employed by the patients themselves or by the advice of a physician.

In the first cases observed by me I always amputated the toe at the level of the furrow when I could assure myself that the continuity of the phalanx no longer existed. When this verification was not possible, I limited myself to waiting for such an opportunity. When, however, the idea occurred to me that the constricting ring was the chief, if not the sole, cause of the loss of the toe, strangulating it slowly, I resolved to practise deep incisions perpendicular to the line of the furrow in cases/much advanced,—that is, when the phalanx could yet be preserved. In the case of two patients in this stage of the disease when this little operation was performed, the edges of the wounds made by incision gaped at once in their centre, changing thus the shape of the wound, as in the case of the incisions made for relief of paraphimosis. Afterwards the furrow became more superficial, and when cicatrization was accomplished the furrow was scarcely apparent. Finally, after the lapse of several months, the place where it had existed was only marked by a darker color of the skin, which was quite level with the adjacent surface. Besides these two cases, I know of one equally successful in the practice of my friend and colleague, Dr. Pires Caldas, of the Charity Hospital. These three cases prove the curability of ainhum, and, without venturing so far as to say that this simple operation will be successful in all cases of slightly developed disease, I yet think myself authorized in recommending it to my colleagues for at least a trial.



